

COMPARATIVE MORTALITY OF BIRDS AT TELEVISION TOWERS IN CENTRAL ILLINOIS

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There have been a number of studies of mortality of migrating birds at television towers in the U.S., including some in Illinois (Brewer and Ellis 1958, Cochran and Graber 1958, Parmalee and Parmalee 1959, Parmalee and Thompson 1963, Graber 1968). Most of these considered mortality at a single tower. Kills of birds at television towers offer one means of learning the timing and geographic patterns of migration and the physiological and population traits of the migrants. The great potential of tower-kill data to provide information on migration has not been fully realized, however, because the coverage of towers has been too limited.

In Illinois in 1973 there were 33 TV transmitting towers and 29 cable TV towers 152.4 m or higher. Fourteen of these were located more or less in an east-west line across central Illinois.

From August to December 1972, we attempted to check 7 of the large (182.9 m or more in height) television towers in central Illinois (Fig. 1) for bird kills. We had 2 primary goals: (1) to acquire research specimens for the Illinois Natural History Survey and the Illinois State Museum, and (2) to acquire comparative data on migration patterns across the state.

METHODS

The towers were checked on all mornings that followed nights with reduced visibility from fog or other precipitation, or with low cloud cover, or both. Seets and his associates at the Natural History Survey checked towers from Macon County (Argenta tower) eastward, and Bohlen and his associates checked the Springfield and Bluffs towers. All intact specimens were collected, weighed, and frozen to be processed later. Crippled birds were counted but not collected. Visible evidence, such as a few feathers or other remnants of carcasses, suggested that several birds in each kill had been eaten by predators. These remnants were also counted but not collected. Great Horned Owls (*Bubo virginianus*), soldier beetles (Cantharidae), and sexton beetles (Silphidae: *Nicrophorus*) appeared to be the principal predators and scavengers involved. Ants were seen on many of the dead birds.

An effort was made to determine the precise timing of each kill, using data from weather stations at Springfield Capitol Airport, Chanute Air Force Base (Fig. 1), and from the U.S. Department of Commerce Daily Weather Maps Weekly Series. The dates of kills referred to in this paper (Table 1) are the dates the birds were collected—the mornings after the kills.

The 2 towers at Springfield are only 3.2 km apart and we have considered them as one location. The central Illinois towers are in generally flat terrain. Vegetation surrounding the towers was either closely mowed grass or standing soybeans and corn, making

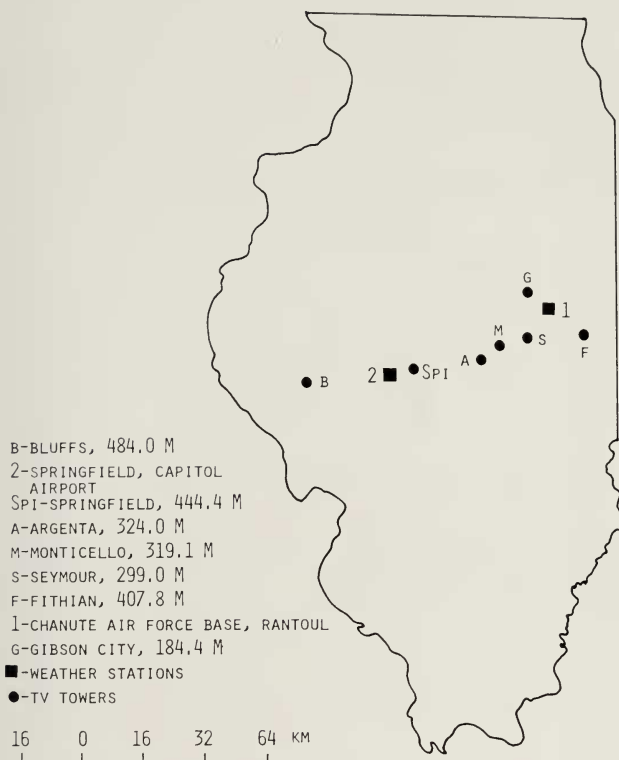


FIG. 1. Location of television towers checked for bird kills.

it difficult to obtain exactly comparable collections from the different towers. However, we believe that collections were at least 70% complete for each tower, based on checks made by several observers both on the mornings after the kills and on subsequent mornings.

All of the towers studied were similarly constructed, being triangular in cross section with at least 6 sets of cable guys at each corner. The towers ranged in height from 184.4 m to 484.0 m (Fig. 1).

RESULTS AND DISCUSSION

On 13 dates between 2 September and 12 November 1972, 5465 birds were collected at the 7 television towers in central Illinois. Most of the birds (93.4%) were killed on 4 nights: 1–2 September, 26–27 September, 28–29 September, and 30–31 October; more than half (59.8%) were killed on the night of 26–27 September.

TABLE 1
SPECIES RECORDED IN THE 4 LARGEST KILLS AT CENTRAL ILLINOIS TELEVISION TOWERS IN THE FALL OF 1972¹

Species	2 Sept.				27 Sept.							29 Sept.			31 Oct.		
	F ²	S	A	SPI	B	F	S	G	M	A	SPI	B	SPI	B	F	M	A
Pied-billed Grebe (<i>Podilymbus podiceps</i>)					2							1	1				
Virginia Rail (<i>Rallus limicola</i>)								1									
Sora (<i>Porzana carolina</i>)	2			3	2	2		2	5	8			2				
Yellow Rail (<i>Coturnicops noveboracensis</i>)								1				1	1				
Common Flicker (<i>Colaptes auratus</i>)												1	3	2			
Red-bellied Woodpecker (<i>Melanerpes carolinus</i>)													1				
Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>)									1				1	1			
Yellow-bellied Sapsucker (<i>Sphyrapicus varius</i>)						2		14	4	5	2	3					
Great Crested Flycatcher (<i>Myiarchus crinitus</i>)					1	1											
Yellow-bellied Flycatcher (<i>Empidonax flaviventris</i>)	1			1				1	1	3							
Alder Flycatcher (<i>Empidonax alhorum</i>)				6													
Least Flycatcher (<i>Empidonax minimus</i>)								1	1	1	1						
Red-breasted Nuthatch (<i>Sitta canadensis</i>)	1					1						1	1				
Brown Creeper (<i>Certhia familiaris</i>)								1				3	2				
House Wren (<i>Troglodytes aedon</i>)									1				1				
Winter Wren (<i>Troglodytes troglodytes</i>)													1				
Long-billed Marsh Wren (<i>Telmatoodytes palustris</i>)						1			1	1	2	1			1		
Short-billed Marsh Wren (<i>Cistothorus platensis</i>)								2		2	1				1		
Gray Catbird (<i>Dumetella carolinensis</i>)						10		1	28	15	25	5	1				
Brown Thrasher (<i>Toxostoma rufum</i>)														1			

TABLE 1—Continued

Species	2 Sept.					27 Sept.					29 Sept.			31 Oct.		
	F ²		A SPI			F	S	G	M	A	SPI	B	SPI	F	M	A
			S	A	SPI											
Wood Thrush (<i>Catharus mustelina</i>)					1	1	3		8	10	1	1				
Hermit Thrush (<i>Catharus guttatus</i>)								1		2				1	2	
Swainson's Thrush (<i>Catharus ustulata</i>)	27		11	39		11			16	5		2	1			
Gray-cheeked Thrush (<i>Catharus minimus</i>)	3		1	1		28		3	25	19		3	2			
Veery (<i>Catharus fuscescens</i>)	23		21	59	26	1		3	2							
Golden-crowned Kinglet (<i>Regulus satrapa</i>)													1	5	14	
Ruby-crowned Kinglet (<i>Regulus calendula</i>)						1		3	9	8		3	4	2	3	
Yellow-throated Vireo (<i>Vireo flavifrons</i>)						1		1	1	2		1				
Solitary Vireo (<i>Vireo solitarius</i>)						1		1	4	1		1				
Red-eyed Vireo (<i>Vireo olivaceus</i>)	31		29	153	42	4	4	6	11	18		9	1	4		
Philadelphia Vireo (<i>Vireo philadelphicus</i>)	2		2	3		11	1	1	8	14		5	2	3		
Black and White Warbler (<i>Mniotilta varia</i>)	2		1	10	4	16	5	3	31	30		17	5	7		
Prothonotary Warbler (<i>Protonotaria citrea</i>)					1											
Golden-winged Warbler (<i>Vermivora chrysoptera</i>)	1		1	5				2	1			1		1		
Tennessee Warbler (<i>Vermivora peregrina</i>)	54		20	177	46	73	9	14	98	80		52	6	27		
Orange-crowned Warbler (<i>Vermivora celata</i>)								3	2			3	1	2	2	
Nashville Warbler (<i>Vermivora ruficapilla</i>)						2	1	12	8	24	48	30	14	1	5	1
Northern Parula (<i>Parula americana</i>)						1	4	4	8	3				1		
Yellow Warbler (<i>Dendroica petechia</i>)						10	6						1			
Magnolia Warbler (<i>Dendroica magnolia</i>)	17		1	14		74	17	24	133	96		15	3	44		
Cape May Warbler (<i>Dendroica tigrina</i>)						2	1	3	2							

TABLE 1—Continued

Species	2 Sept.					27 Sept.					29 Sept.			31 Oct.		
	F ²	S	A	SPI	B	F	S	G	M	A	SPI	B	SPI	F	M	A
Black-throated Blue Warbler (<i>Dendroica caerulescens</i>)						3		4	5	5	2	1	2			
Yellow-rumped Warbler (<i>Dendroica coronata</i>)						11	1	6	27	11	4		14	6	111	3
Black-throated Green Warbler (<i>Dendroica virens</i>)	2			4	2	42	14	17	65	81	13	7	13		1	
Blackburnian Warbler (<i>Dendroica fusca</i>)	12			1	21	5	7	2	1	8	4	3	1			
Chestnut-sided Warbler (<i>Dendroica pensylvanica</i>)	7			1	14	5	11	3	7	39	14	5	9			
Bay-breasted Warbler (<i>Dendroica castanea</i>)				1	5	2	79	13	13	61	51	14	6	29		
Blackpoll Warbler (<i>Dendroica striata</i>)	7					26		7	18	3	5	1				
Pine Warbler (<i>Dendroica pinus</i>)									1	1			1			
Palm Warbler (<i>Dendroica palmarum</i>)	1							20	3	5	12	6	7	1	14	
Ovenbird (<i>Seiurus aurocapillus</i>)	19	1	9	71	33	91	30	41	143	142	51	26	53			
Northern Waterthrush (<i>Seiurus noveboracensis</i>)	11			2	52	17	1	3	14	18	7	1	9			
Connecticut Warbler (<i>Oporornis agilis</i>)	1			1	3	3	1		1							
Mourning Warbler (<i>Oporornis philadelphia</i>)					1	2					1	1				
Common Yellowthroat (<i>Geothlypis trichas</i>)	1			2	2	8		4	23	20	41	6	17			
Wilson's Warbler (<i>Filstonia pusilla</i>)						1	1		2	4	2	1				
Canada Warbler (<i>Filstonia canadensis</i>)	1			7	7		1	1	1	1						
American Redstart (<i>Setophaga ruticilla</i>)	23			5	22	7	48	5	12	60	33	13	23			
Bobolink (<i>Dolichonyx oryzivorus</i>)	17			2	34	5	2		2	2	4	3				
Northern Oriole (<i>Icterus galbula</i>)		1		1	1	5	4									
Scarlet Tanager (<i>Piranga olivacea</i>)							1	1	1	1	2	1				
Rose-breasted Grosbeak (<i>Pheucticus ludovicianus</i>)				4	2	16	2	36	18	23	4	10				

TABLE 1—Continued

Species	2 Sept.					27 Sept.					29 Sept.					31 Oct.				
	F ²		A			S		B			F		S			A		S		
Indigo Bunting (<i>Passerina cyanea</i>)					1											3	2	5	1	1
Dickcissel (<i>Spiza americana</i>)					1												1			1
Savannah Sparrow (<i>Passerculus sandwichensis</i>)					1						1					2	1		1	1
Grasshopper Sparrow (<i>Ammodramus savannarum</i>)																1				1
Sharp-tailed Sparrow (<i>Ammodramus caudatus</i>)											1					1				
Dark-eyed Junco (<i>Junco hyemalis</i>)																				1
Chipping Sparrow (<i>Spizella passerina</i>)																1				1
Field Sparrow (<i>Spizella pusilla</i>)																			1	5
White-crowned Sparrow (<i>Zonotrichia leucophrys</i>)																				1
White-throated Sparrow (<i>Zonotrichia albicollis</i>)																3	3		1	1
Lincoln's Sparrow (<i>Melospiza lincolni</i>)											1					2	2	2	1	2
Swamp Sparrow (<i>Melospiza georgiana</i>)											3					2		2	2	1
Song Sparrow (<i>Melospiza melodia</i>)																			3	2
TOTAL	266	2	110	735	221	634	127	206	992	807	391	107	319	29	184	8				

5,138

¹ Eight additional mortalities included a Brown Creeper and a Black-throated Blue Warbler on 10 October at SPI, a Short-billed Marsh Wren, a Grasshopper Sparrow and a Henslow's Sparrow at A, and Virginia Rail, a Red-winged Blackbird, and a Fox Sparrow on 12 November at SPI.

² For identification of localities, see Fig. 1.

TABLE 2

A COMPARISON OF THE RATIOS OF BIRDS KILLED AT TOWERS IN WESTERN ILLINOIS AS COMPARED TO KILLS AT TOWERS IN EASTERN ILLINOIS DURING SEPTEMBER FOR THE YEARS 1958, 1962, AND 1972¹

Species	1958		1962		1972	
	16-17 Sept. West ²	15-17 Sept. East ²	24-25 Sept. West ³	24-25 Sept. East ³	2-27 Sept. West	2-27 Sept. East
Swainson's Thrush	1.0	3.1	1.0	4.5	1.3	1.0
Gray-checked Thrush	1.0	1.3	1.0	5.2	1.0	1.6
Veery	1.3	1.0			3.8	1.0
Red-eyed Vireo	1.1	1.0	2.8	1.0	4.3	1.0
Tennessee Warbler	3.8	1.0	2.1	1.0	1.8	1.0
Magnolia Warbler	2.8	1.0	1.0	1.4	1.0	5.2
Bay-breasted Warbler	4.3	1.0	1.9	1.0	1.0	3.7
Northern Waterthrush	5.3		2.8	1.0	3.4	1.0
Common Yellowthroat	2.8		2.8	1.0	2.0	1.0
Bobolink	1.0	6.0	1.1	1.0	3.7	1.0
Chestnut-sided Warbler	11.9	1.0	2.1	1.0	1.0	1.9
Ovenbird	3.9	1.0	1.7	1.0	1.0	5.7
American Redstart	3.7		1.0	1.2	1.0	2.0
Total Birds	827	147	213	296	1,454	3,144

¹ In comparing the ratios, data were adjusted to correct differences in total birds killed between eastern and western towers during the given dates for each year.

² Data for 1958 West are from Parmalee and Parmalee, 1959.

³ Data for 1958 East, 1962 East, West are from Graber, 1968.

Inspection of our data shows no consistent relationship between tower height, terrain, or tower location and number of birds killed for the kills we studied. Kills were neither consistently high nor low at any particular tower. We believe that the number of birds killed at a given tower on a given night is related primarily to local weather conditions and to the number of birds flying.

Kills in relation to weather factors.—The kills occurred following the passage of cold fronts, usually when conditions of low overcast (550 m or less) and reduced visibility (< 8 km) prevailed; however, 4 of the kills occurred when the lowest overcast was 1220 m to 1830 m and the visibility was 11.3 km or more. On the 4 nights when 93% of the birds were killed, ceilings were 550 m or less. All kills occurred within 32 h (usually within 6 h) after the passage of cold fronts, when the winds were from the north. We do not know exactly when during the night the kills occurred. It may be important to know the precise timing of the kills when comparing bird losses at the different towers (Table 2), because the time factor may have a bearing on the species killed.

TABLE 3
SPECIES RECORDED IN THE SMALL KILLS AT CENTRAL ILLINOIS TELEVISION TOWERS IN THE FALL OF 1972¹

Species	SPI 4 Sept.	SPI 14 Sept.	S 14 Sept.	F 14 Sept.	SPI 21 Sept.	SPI 28 Sept.	SPI 10 Oct.	SPI 12 Oct.	A 28-29 Oct.	SPI 10-12 Nov.
Virginia Rail										1
Sora Rail		1								
Yellow-billed Cuckoo	1									
Brown Creeper							1			1
House Wren										1
Winter Wren										
Long-billed Marsh Wren						3	1			
Short-billed Marsh Wren									1	
Catbird						2	1			
Wood Thrush	1					1				
Hermit Thrush							2		1	
Swainson's Thrush	3	7	1	9		1	1			
Gray-checked Thrush										
Veery	10	1		1						
Golden-crowned Kinglet							2	1	2	1
Ruby-crowned Kinglet							2	1	1	1
Solitary Vireo						1		1		
Red-eyed Vireo	9	2				2				
Philadelphia Vireo	1					2				
Black-and-white Warbler	2	1					1			
Tennessee Warbler	11	1		2	3	8	3			
Orange-crowned Warbler									2	
Nashville Warbler					1	4	3			
Northern Parula							4		1	
Magnolia Warbler						2	2			
Black-throated Blue Warbler							1			

TABLE 3—Continued

Species	SPI ¹ 4 Sept.	SPI 14 Sept.	S 14 Sept.	F 14 Sept.	SPI 21 Sept.	SPI 28 Sept.	SPI 10 Oct.	SPI 12 Oct.	SPI 18 Oct.	A 28-29 Oct.	SPI 10-12 Nov.
Yellow-rumped Warbler						1	23			28	8
Black-throated Green Warbler						6	3	1			
Blackburnian Warbler	1	2									
Chestnut-sided Warbler	1	1				2					
Bay-breasted Warbler	1	1			2	1	2				
Blackpoll Warbler							1				
Palm Warbler		1					7				
Ovenbird	8				1	11	2				
Northern Waterthrush	4	2				1					
Common Yellowthroat	1				1	8	5		1		
Canada Warbler	2										
American Redstart	3	1			2						
Red-winged Blackbird											1
Northern Oriole	1										
Scarlet Tanager		1			1						
Rose-breasted Grosbeak						1	1				
Indigo Bunting							2	1			
Savannah Sparrow										4	5
Grasshopper Sparrow										1	
Henslow's Sparrow										1	
Dark-eyed Junco										2	2
Field Sparrow										1	2
White-throated Sparrow								1			1
Fox Sparrow											1
Lincoln's Sparrow						1					
Swamp Sparrow							4	2		2	1
Song Sparrow							1				1

¹ For identification of localities, see Fig. 1.

In analyzing the relationship of the kills to weather, we have emphasized the data for the large kills in order to have sufficient numbers for comparison. Comparative data for the large kills are presented in Table 1 and the small kills are summarized in Table 3.

Comparison of kills.—Graber's (1968) radar transect data on the migration in central Illinois in September show that the number of nocturnal migrants is fairly uniform at different locations across the state. Thus, if weather conditions were the same at all towers, we would expect the number of birds killed at each tower to be similar, but, in fact, there are great differences in the numbers of birds killed at different towers on the same night (Table 1). On 27 September, for example, kills ranged from 107 birds to 992 at different towers of comparable height. There were very different numbers of birds killed at towers as close (19.3 km) as Seymour and Monticello—127 versus 992. Such differences cannot be explained without more detailed weather records than are presently available.

Although the data from radar transects for central Illinois indicate a fairly uniform distribution of total night migrants across the state in September, this does not necessarily indicate a uniform statewide distribution of each species. Because large television towers are well distributed across central Illinois, the kills at those towers provide a means of comparing the species composition of the flights of migrants in the eastern and western segments of the state. In making such a comparison, we find that some species appear relatively more numerous in the kills on the western side of the state while other species are more prevalent on the eastern side. Chi-square analysis of the data for species involving 20 or more individuals indicated that the species composition did, in fact, differ significantly between the eastern and the western towers ($\chi^2 = 736$; $P < 0.001$). The analysis seems to indicate a difference in the relative numbers of birds of individual night migrating species between the east and west sides of Illinois.

In a few cases, species were not present in kills on one side of the state but were represented on the other side. These instances included the Common Flicker (6), Great Crested Flycatcher (2), Alder Flycatcher (6), and Yellow Warbler (17), all found at western towers but not at eastern towers. Only the Cape May Warbler (8) and Grasshopper Sparrow (1) were present at eastern towers but not at western towers on nights when kills occurred on both sides of the state.

Other species were present in kills on both sides of the state but differed significantly in numbers from one side to the other (Table 2). It is worthwhile to compare our 1972 data on the species killed at western versus eastern towers with Graber's (1968) and Parmalee's data for 1958 for the

same region (Table 2). In several species (for example, see thrushes) the pattern was consistent in all years.

Rare and/or infrequent species.—A few species deserve special comment, either because of their rarity, or because of their infrequent occurrence in tower kills.

Yellow Rail: Single Yellow Rails were found among tower kills at Springfield on 27 and 29 September and at Monticello on 27 September, marking the first time that the Yellow Rail was found among tower kills on the eastern side of the state.

Red-bellied Woodpecker: The kill of night migrants on 27 September 1972 at the television tower at Bluffs included a Red-bellied Woodpecker, a supposedly non-migratory species.

Black-throated Blue Warbler: On 27 September 1972, 17 Black-throated Blue Warblers were killed on the eastern side of the state and 3 were killed on the western side. Three were killed on the western side on 29 September (2) and 10 October (1). These kills were high compared with the number of Black-throated Blue Warblers (1 or 2 a season) seen in the field in Illinois.

Henslow's Sparrow: One was found among tower kills on the eastern side of the state for the first time on 28–29 October 1972, at Argenta.

Sharp-tailed Sparrow: The Sharp-tailed Sparrow was found for the first time in kills at eastern towers on 27 September at Fithian (1) and Monticello (1).

Field Sparrow: On 31 October 1972 a Field Sparrow was found for the first time among eastern tower kills at Fithian (1), Monticello (5), and Argenta (1).

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